

Listing of the Claims:

Please amend claims 1, 20 and 25 as indicated below. This listing of claims replaces all prior versions.

1. (Currently Amended) A method for allocating user transmission rates in a communication system that is adapted to permit the users to transmit data simultaneously via shared frequency and spatial resources, the method comprising:

while maintaining the transmission rates of the users to at least a minimum user transmission rate to provide an expected minimum quality of communication for each of the users, incrementally adjusting the transmission rates of the users by iteratively changing the transmission rate of each user as a function of

a resulting vector of transmit powers ensuing from the ~~increased~~
incremental adjustment of the transmission rate,

a degree of transmission-rate-allocation unfairness relative to the
transmission rates of all the users, and

a power-based selection criteria.

2. (Original) The method of claim 1, wherein the degree of transmission-rate-allocation unfairness is a function of a ratio of a maximum user transmission rate to a minimum user transmission rate.

3. (Original) The method of claim 1, further including using the resulting vector and the degree of transmission-rate-allocation unfairness to identify a user for the corresponding iteration and, therefrom, increasing its transmission rates in a next iteration.

4. (Original) The method of claim 1, further including using the resulting vector and the degree of transmission-rate-allocation unfairness to identify a user from the set of all users, that optimizes the selection criteria for the corresponding iteration and, therefrom, increasing its transmission rates in a next iteration.

5. (Original) The method of claim 1, wherein the system is an OFDM (orthogonal-frequency-division-multiplex) communication system and further including transmitting the data from the users using OFDM communication.
6. (Original) The method of claim 1, wherein the system is a CDMA (code-division-multiple-access) communication system and further including transmitting the data from the users using CDMA communication.
7. (Original) The method of claim 1, further including setting the transmission rates of the users to the minimum user transmission rate before incrementally adjusting the transmission rates of the users.
8. (Original) The method of claim 1, wherein iteratively changing the transmission rate of each user includes iteratively changing the transmission rate by a constant.
9. (Original) The method of claim 1, wherein the power-based selection criteria is selected from the set of: minimization of average transmit power; minimization of maximum transmit power; and minimization of total received power.
10. (Original) A method for allocating transmission rates to multiple users in a communication system that is adapted to permit the users to transmit data simultaneously via shared frequency and spatial resources, the method comprising:
 - (a) setting the transmission rates of the users to at least a minimum user transmission rate to provide an expected minimum quality of communication for each of the users and then incrementally adjusting the transmission rates of the multiple users by iteratively increasing the transmission rates per the following steps:
 - (b) for each user, increasing its transmission rate without changing the transmission rate of the other users, thereby providing a set of transmission rates that include a maximum user transmission rate and a minimum user transmission rate and, therefrom, determining

a resulting vector of transmit powers ensuing from the increased transmission rate, and

a degree of transmission-rate-allocation unfairness as a function of a ratio of a maximum user transmission rate to a minimum user transmission rate;

(c) from the resulting vector and the degree of transmission-rate-allocation unfairness, determining whether an increased one of the transmission rates for a corresponding one of the users satisfies a multi-user based selection criteria and, in response, increasing its transmission rate.

11. (Original) The method of claim 10, wherein the multi-user based selection criteria includes a power-based selection criteria, and further including, after step (c), repeating steps (b) and (c) until an iteration in which none of the transmission rates satisfies the power-based selection criteria and satisfies the degree of transmission-rate-allocation unfairness.

12. (Original) The method of claim 10, wherein the system is an OFDM (orthogonal-frequency-division-multiplex) communication system and further including transmitting the data from the users using OFDM communication.

13. (Original) The method of claim 12, wherein the multi-user based selection criteria includes a power-based selection criteria, and further including, after step (c), repeating steps (b) and (c) until an iteration in which none of the transmission rates satisfies the power-based selection criteria and satisfies the degree of transmission-rate-allocation unfairness.

14. (Original) The method of claim 10, wherein the system is an OFDM (orthogonal-frequency-division-multiplex) communication system permitting the users to transmit the data on multiple frequencies and further including transmitting the data from the users using OFDM communication.

15. (Original) The method of claim 10, wherein the system is a CDMA (code-division-multiple-access) communication system and further including transmitting the data from the users using CDMA communication.

16. (Original) The method of claim 15, wherein the multi-user based selection criteria includes a power-based selection criteria, and further including, after step (c), repeating steps (b) and (c) until an iteration in which none of the transmission rates satisfies the power-based selection criteria and satisfies the degree of transmission-rate-allocation unfairness.

17. (Original) The method of claim 10, further including, after step (c), repeating steps (b) and (c) until an iteration in which none of the transmission rates satisfies the degree of transmission-rate-allocation unfairness.

18. (Original) The method of claim 10, further including, after step (c), repeating steps (b) and (c) until an iteration in which none of the transmission rates satisfies the multi-user based selection criteria.

19. (Original) The method of claim 10, further including, after step (c), repeating steps (b) and (c) until an iteration in which none of the transmission rates satisfies the multi-user based selection criteria and, thereafter, attempting to optimize system operation.

20. (Currently Amended) A communication system adapted to allocate transmission rates to multiple users and to permit the users to transmit data simultaneously via shared frequency and spatial resources, the system comprising:

means for maintaining the transmission rates of the users to at least a minimum user transmission rate to provide an expected minimum quality of communication for each of the users; and

means, operative while maintaining the transmission rates of the users to at least a minimum user transmission rate, for incrementally adjusting the transmission rates of the users by iteratively changing the transmission rate of each user as a function of

a resulting vector of transmit powers ensuing from the ~~increased~~
incremental adjustment of the transmission rate,

a degree of transmission-rate-allocation unfairness relative to the
transmission rates of all the users, and
a power-based selection criteria.

21. (Original) A communication system adapted to allocate transmission rates to multiple users and to permit the users to transmit data simultaneously via shared frequency and spatial resources, the system comprising:

means for setting the transmission rates of the users to at least a minimum user transmission rate to provide an expected minimum quality of communication for each of the users; and

means for incrementally adjusting the transmission rates of the multiple users by iteratively increasing the transmission rates as follows:

for each user, increasing its transmission rate without changing the transmission rate of the other users, thereby providing a set of transmission rates that include a maximum user transmission rate and a minimum user transmission rate and, therefrom, determining

a resulting vector of transmit powers ensuing from the increased
incremental adjustment of the transmission rate, and

a degree of transmission-rate-allocation unfairness as a function of a ratio
of a maximum user transmission rate to a minimum user transmission rate; and
from the resulting vector and the degree of transmission-rate-allocation
unfairness, determining whether an increased one of the transmission rates for a
corresponding one of the users satisfies a multi-user based selection criteria and, in
response, increasing its transmission rate.

22. (Original) The system of claim 21, wherein the system is an OFDM (orthogonal-frequency-division-multiplex) communication system permitting the users to transmit the data on multiple frequencies and further including transmitting the data from the users using OFDM communication.

23. (Original) The method of claim 21, wherein the system is a CDMA (code-division-multiple-access) communication system and further including transmitting the data from the users using CDMA communication.

24. (Original) The method of claim 21, wherein the system is a CDMA (code-division-multiple-access) cellular communication system and wherein the rate allocation is provided to multiple users communicating with a common base station for the cellular communication system, and further including transmitting the data from the users to common base station using CDMA communication.

25. (Currently Amended) For use in a communication system adapted to allocate transmission rates to multiple users and to permit the users to transmit data simultaneously via shared frequency and spatial resources, a data terminal comprising:

- a clock-based circuit that maintains a data transmission rate of the data terminal as a function of a minimum user transmission rate defined to provide an expected minimum quality of communication for each of the users; and

- a data transmission rate adjustment circuit that incrementally adjusts the transmission rate of the data terminal as a function of

- a resulting vector of system-level transmit powers ensuing from the incremental adjustment of the transmission rate,

- a degree of transmission-rate-allocation unfairness relative to the transmission rates of all the users, and

- a system-level power-based selection criteria.